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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

NGUYEN, LAM S

ART UNIT PAPER NUMBER

2853

DATE MAILED: 09/30/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/905,536

Applicant(s)

DYKSTRA, JERALD P.

Examiner

LAM S NGUYEN

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 01 August 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-34 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 11-20, 24-26 and 31-34 is/are allowed.
- 6) ☒ Claim(s) 1-5, 21, 27 and 30 is/are rejected.
- 7) ☒ Claim(s) 6-10, 22-23, 28-29 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 13 July 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claims 1-5, 21, 27, and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Berkowitz (US 4849641) in view of Bakker (US 3634683).

Berkowitz discloses an apparatus for gas cluster ion beam (GCIB) mass or cluster size diagnostics for improving GCIB workpiece processing, comprising:

a vacuum vessel (FIG. 1: a corresponding cover of the system);

a gas cluster ion beam source within the vacuum vessel for producing a gas cluster ion beam (FIG. 1, element 8);

an accelerator for accelerating the gas cluster ion beam along a first trajectory (FIG. 1, element 26);

a beam deflector (FIG. 1, elements 47, 42) controllably deflecting the gas cluster ion beam along a second trajectory (FIG. 1: a corresponding trajectory to the target chamber 46), said second trajectory diverging from said first trajectory (FIG. 1, element 45) by a predetermined offset angle.

workpiece holding means disposed along the second trajectory for holding a workpiece for gas cluster ion beam processing (FIG. 1, element 48) (**Referring to claim 30**);

control means for providing deflection signals to said beam deflector for

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controllably deflecting the gas cluster ion beam between said first trajectory and said second trajectory (FIG. 1: element 43).

Berkowitz does not disclose beam detection means comprising a faraday enclosure for collecting beam current signals (**Referring to claim 5**) disposed along said first trajectory at a predetermined distance, D, from said beam deflector, time-of-flight measurement means for measuring the times-of-flight of components of the gas cluster ion beam over said distance, D; and a time-of-flight analyzer to analyze said times of flight of components of the gas cluster ion beam in order to provide output information that is an estimate of the size or mass distribution of cluster components displayed by display means (**Referring to claims 2, 3**) relative to GCIB mass or cluster size wherein said output information is used in the gas cluster ion beam processing of the workpiece by system control means operably connected to said time-of-flight analyzer for receiving output information (**Referring to claim 4**).

Bakker discloses an apparatus having beam detection means comprising a faraday enclosure for collecting beam current signals (FIG. 1, the element covers elements 23-26) disposed along a first trajectory (FIG. 1: location of elements 23-26) at a predetermined distance, D (FIG. 2, element L), from a beam deflector (FIG. 1, element 22), time-of-flight measurement means for measuring the times-of-flight of components of the gas cluster ion beam over said distance, D (Column 7, line 14-21) and a time-of-flight analyzer to analyze said times of flight of components of the gas cluster ion beam in order to provide output information that is an estimate of the size or mass distribution of cluster components displayed by display means relative to GCIB mass or cluster size wherein said output information is used in the gas cluster ion beam

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processing of the workpiece system control means operably connected to said time-of-flight analyzer for receiving output information (Column 7, line 14-21).

Therefore, it would have been obvious for one having ordinary skill in the art at the time the invention was made to include beam detection means disposed along a first trajectory at a predetermined distance from a beam deflector, time-of-flight measurement means for measuring the times-of-flight of components of the gas cluster ion beam over said distance, and a time-of-flight analyzer to analyze said times of flight of components of the gas cluster ion beam in order to provide output information used in the gas cluster ion beam processing of the workpiece as disclosed by Bakker into the apparatus for gas cluster ion beam processing disclosed by Berkowitz. The motivation of doing so is to increase the sensitivity due to the continuous ionization process and the resolution due to the lack of space defocusing as taught by Bakker (column 2, line 28-33).

Allowable Subject Matter

2. Claims 6-10, 22-23, 28-29 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Referring to claim 6: The most pertinent arts Berkowitz (US 4849641) and Bakker (US 3634683) fail to disclose wherein the deflection signals comprise a beam switching signal that switches a beam pulse along said first trajectory in order to measure the times-of-flight of components of the gas cluster ion beam over said distance, D. Therefore, the claimed invention is not disclosed by the cited prior arts.

Referring to claims 7-8: Allowable since their dependence on the allowable claim 6.

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Referring to claims 9, 10, 22-23, 28-29: The most pertinent arts Berkowitz (US 4849641) and Bakker (US 3634683) fail to disclose wherein the output information relative to GCIB mass or cluster size is ascertained by the following formula:

$$m_i = 2E / V(\exp(2)) = 2E / ((D / t_d)\exp(2)) = 2E (t_d \exp(2)) / D\exp(2)$$

$$= 2qeV_{acc}(t_d \exp(2)) / D\exp(2)$$

where m_i = mass of ion (or cluster ion)

E = GCIB energy

v = velocity of ion (or cluster ion)

D = ion (or cluster ion) flight distance

$t_d = t - t_0$ = ion(or cluster ion) time of flight

V_{acc} = total beam acceleration potential

$q = 1$ = cluster charge state

e = unit charge (electronic charge)

and $N = m_i / m_m$ and $N' = N / q$

where N = cluster size

m_i = mass of ion (or cluster ion)

m_m = mass of a molecule of the gas forming clusters.

Therefore, the claimed invention is not disclosed by the cited prior arts.

3. Claims 11-20, 24-26, 31-34 are allowed.

Referring to claims 11, 24, 31: The most pertinent arts Berkowitz (US 4849641) and Bakker (US 3634683) fail to disclose a beam deflector for controllably deflecting the gas cluster ion beam along a second trajectory said second trajectory diverging from said first trajectory by a

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predetermined first offset angle, and for controllably deflecting the gas cluster ion beam along a third trajectory, said third trajectory diverging from said second trajectory by a predetermined second offset angle greater than said predetermined first offset angle. Therefore, the claimed invention is not disclosed by the cited prior arts.

Referring to claims 12-20, 25-26, 33-34: Allowed since their dependence on the allowed claims 11, 24, 31.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to LAM S NGUYEN whose telephone number is (703)305-3342. The examiner can normally be reached on 7:00AM - 3:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, STEPHEN D. MEIER can be reached on (703)308-4896. The fax phone numbers for the organization where this application or proceeding is assigned are (703)872-9306 for regular communications and (703)305-3432 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)308-0956.

LN

September 23, 2003


Stephen D. Meier
Primary Examiner